there was a large quantity, so that it was recrystallized twice. A platinum-salt made from the chloride insoluble in absolute alcohol (of which there was only a very small quantity), gave 44·3 per cent. platinum, which is almost the same as the amount in chloroplatinate of ammonia. No phenylic alcohol was found nor any of its compounds; and according to an experiment of Long (not yet published), on the oxidation of phenylic alcohol, that chemist always, excepting when he used spongy platinum, obtained a resinous mass.

From the above experiments, it appears that by the action of nitrous acid, nitric acid, binoxide of manganese and sulphuric acid, permanganate of potash*, potash†, and in some cases by the presence of acids alone (as sulphuric or hydrochloric)‡, on the organic bases in the presence of water, water only is decomposed in the first stage of the reaction; and the fact that the radicals contained in the bases are replaced by hydrogen by degrees, makes it plausible that by these means we may be able to determine the constitution of the natural organic bases.

I am now experimenting with narcotine, and to all appearance, I shall succeed in determining its constitution.

In conclusion, I may here be allowed to thank Dr. Holzmann for his assistance in carrying out the above experiments.

February 10, 1859.

Sir BENJAMIN C. BRODIE, Bart., President, in the Chair.

The following communication was read:—

"Experiments on the Action of Food upon the Respiration." By EDWARD SMITH, M.D., LL.B., L.R.C.P., Assistant-Physician to the Hospital for Consumption, Brompton. Communicated by Sir BENJAMIN C. BRODIE, Bart. Received January 6, 1859.

(Abstract.)

The author had proved in his former Paper that the maximum influence of food is observed within two and a half hours after its

* By its action on aniline, ammonia is obtained. † In its action on the amides.

‡ In the case of asparagine, benzamide, &c.

exhibition; also that the action of food is in two degrees; viz. that which sustains the respiratory changes to the minimum line (or that which occurs with complete abstinence), and that which is observed as the maximum point to which the respiratory function is increased after ordinary meals. His aim in this communication was to show the variations in the influence of food between these two lines. His method of inquiry was to take a moderate quantity of a single article of food alone, before breakfast, whilst the body was at rest and in the sitting posture, and to determine the influence every ten or fifteen minutes during a period of about two hours. He noted the amount of carbonic acid exhaled and of air inhaled, with the rate of respiration and pulsation, and also the temperature and the barometric pressure of the atmosphere. The apparatus employed was that described in his former Paper, and the gentlemen who submitted themselves to the investigation were chiefly the author and Mr. Moul, with Professor Frankland, F.R.S., Mr. Hoffman, and Mr. Reid, who engaged in a few experiments.

The following foods were subjected to inquiry:—

1. *The starch series,* viz. arrowroot, arrowroot and butter, arrowroot and sugar, commercial starch, wheat starch, gluten, bread, oatmeal, rice, rice and butter, potato.

2. *The fat series,* viz. butter, olive oil, cod-liver oil.

3. *Sugars,* viz. cane sugar, cane sugar and butter, cane sugar with acids and alkalies, grape sugar, sugar of milk.

4. *The milk series* (cows' milk), viz. new milk, skimmed milk, casein, casein and lactic acid, lactic acid, sugar of milk and lactic acid, cream.

5. *Alcohols,* viz. alcohol, brandy, whisky, gin, rum, sherry wine, port wine, stout, and ale.

6. *The tea series,* viz. tea, green and black, hot and cold, in various quantities, and with acids and alkalies; coffee, coffee-leaves, chichory, and cocoa.

7. *Some other nitrogenous substances,* viz. gelatin, albumen, fibrine, almond-emulsion.

The author found that pure starch scarcely increased the amount of carbonic acid evolved, but the combination of starch with gluten and sugar in the cereals caused an increase of about 2 grains per

minute. Wheat flour, oatmeal, and rice had similar effects, but potato had a less enduring influence.

Fats lessened the amount of carbonic acid evolved, and when taken with starch, the cereals, or sugar, somewhat lessened their power to produce carbonic acid. Fats increased pulsation.

Sugars increased the carbonic acid evolved to the maximum extent of from $1\frac{1}{2}$ to $2\frac{1}{2}$ grains per minute in about half an hour. Cane sugar was more powerful than milk sugar, and still more so than grape sugar. Acids increased the maximum influence of sugar.

Milk increased both the pulsation and the carbonic acid, and the latter to a maximum of nearly 2 grains per minute. All the component elements except lactic acid had a similar influence, but new milk was much more powerful than any of its elements separately, or than any artificial combination of its elements. The effect of milk differed in degree, and of casein in direction, upon the author and Mr. Moul.

Tea and coffee increased the production of carbonic acid to the extent of from $1\frac{1}{2}$ to 3 grains per minute. Tea was more powerful than coffee, and coffee than chichory. Cocoa was as powerful as coffee. Coffee-leaves lessened the amount of carbonic acid. Acids added to tea rendered it more stimulating, and alkalies made it more soothing.

Alcohols differed in their effect, according both to different kinds and samples of the same kind. Spirits of wine always increased the quantity of carbonic acid evolved to a maximum of less than 1 grain per minute. Rum commonly increased it, and sometimes to $1\frac{1}{2}$ grain per minute. Ale and stout increased it to upwards of 1 grain per minute. Sherry wine (3 oz.) commonly slightly increased it. Brandy and gin, and particularly the latter, always decreased it. Whisky varied in its effects. The inhalation of the volatile elements of wine and spirits, and particularly of fine old port wine, lessened the quantity of carbonic acid, and increased the amount of vapour exhaled.

Gluten, casein, gelatin, albumen, and fibrin increased the amount of carbonic acid exhaled, the two former to about 1 grain per minute, and the last to about $\frac{1}{2}$ grain per minute. Almond-emulsion did not increase it.

From these facts the author infers that there is a class of foods which might be called "excito-respiratory;" a class which embraces

nearly all nitrogenous foods, and is almost entirely composed of these substances.

The *non-excitants* are starch, fat, some alcohols, and coffee-leaves.

The *respiratory excitants* are sugar, milk, the cereals, potato, tea, coffee, chichory, cocoa, alcohol, rum, ales, some wines, gluten, casein, gelatin, fibrin, and albumen.

Of the hydrocarbons, sugar acted very differently from starch and fat.

All the "respiratory excitants" increased the *depth*, but not the *rate* of respiration.

Some of them acted with great rapidity; as, for example, sugar and tea, which sometimes caused an increase of 1 grain of carbonic acid per minute in from five to eight minutes. Others, as gluten and casein, acted with less rapidity. In many, as tea and gluten, there was not a proportionate increase in the carbonic acid with increase in the quantity of the "excitant." Some of them, as tea, produced much greater effect when a small dose was frequently repeated, than when the whole quantity was given at once, and caused a much greater evolution of carbon than they supplied. The duration of the increase was very different with different foods, but that with sugar was the least, and then that with tea, while that with the cereals and rum and milk was the greatest. The amount of carbonic acid progressively increased at each examination until the maximum was attained; after which it remained nearly stationary for some time, as with the cereals, or subsided rapidly to the basis quantity, as with sugar.

The paper was illustrated by a series of diagrams, and accompanied by tables.